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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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June 1970

U.S. Training and
Employment Service
Technical Report
S-270R

Development of USTES

APTITUDE TEST
BATTERY FOR

# NURSE, LICENSED, PRACTICAL

(medical ser.)
079.378

U.S. DEPARTMENT OF LABOR
Manpower Administration

TM 001 916

ED 065616

# Technical Report on Development of USTES Aptitude Test Battery

For . . . .

Nurse, Licensed, Practical (medical ser.) 079.378

S-270R

(Developed in Cooperation with the Minnesota
and New York State Employment Services)

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EDUCATION & WELFARE
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U.S. Department of Labor
Manpower Administration

June 1970

## FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study #2745, 2363

Development of USTES Aptitude Test Battery

For

Nurse, Licensed, Practical (medical ser.) 079.378-026

S-270R

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Nurse, Licensed, Practical (medical ser.) 079.378-026. The following norms were established:

| GATB Aptitudes | Minimum Acceptable GATB Scores |
|---|---|
| G - General Learning Ability | 85 |
| N - Numerical Aptitude | 80 |
| Q - Clerical Perception | 85 |
| M - Manual Dexterity | 80 |

Research Summary

Sample:

94 (90 female and 4 male) workers employed as Licensed Practical Nurses in New York.

The exact minority group distribution of the final sample in this study is unknown. However, it is estimated that the final sample of 94 contained approximately 71 Negroes and 11 Spanish-Americans.

Criterion:

Supervisory ranking.

Design:

Longitudinal - (test data were collected in 1964 as individuals entered, MDTA training and criterion data were collected in 1969).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, aptitude-criterion correlations and selective efficiences.

Concurrent Validity:

Phi Coefficient = .30 (P/2 $<$.005)

Effectiveness of Norms:

Only 55% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 70% would have been good workers. Forty-five percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 30% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

| | Without Tests | With Tests |
|---|---|---|
| Good Workers | 55% | 70% |
| Poor Workers | 45% | 30% |

SAMPLE DESCRIPTION

Size:

N=94

Occupational Status:

Employed workers.

Work Setting:

Workers were employed by the medical facilities listed, as follows:

| Medical Facility | Number of LPN's |
|---|---|
| **City Hospitals** | |
| Kings County | 26 |
| Morrisania | 9 |
| Queens Hospital Center | 8 |
| Coney Island | 6 |
| Cumberland | 6 |
| Bellevue | 4 |
| Jacobs | 4 |
| Bird S. Coler | 1 |
| Manhattan Rehabilitation Center | 1 |
| Goldwater Memorial | 1 |
| Elmhurst | 1 |
| | N=67 |
| **Federal Hospitals** | |
| Veterans Administration | N= 3 |
| **State Hospitals** | |
| Manhattan State | N= 1 |
| **Voluntary Hospitals** | |
| Bronx-Lebanon | 2 |
| Columbia Presbyterian | 2 |
| Unity | 2 |
| Astoria General | 1 |
| Jamaica | 1 |
| St. Patricks Home for the Aged | 1 |
| Methodist | 1 |
| Menorah Home for the Aged | 1 |
| Roosevelt | 1 |
| Mary Immaculate | 1 |
| Arthur Kill Rehabilitation | 1 |
| Daughters of Jacob Geriatric Center | 1 |
| The New York Hospital | 1 |
| | N=16 |
| **Proprietary Hospitals** | |
| Park East | 1 |
| Interboro Nursing | 1 |
| Isabella Home | 1 |
| Woodbury Nursing | 1 |
| Franklin Park Nursing | 1 |
| Highland Park | 1 |
| Dumont Nursing | 1 |
| | N= 7 |

Employer Selection Requirements:

Education: Eighth grade required.

Previous Experience: None required.

Tests: The GATB was administered but the results were not used for referral.

Other: Personal interview.

Principal Activities:

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers in the final sample had at least six months job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Biserial Correlations with the Criterion (r) for Age, Education and Experience; N = 94.

| | Mean | SD | Range | r |
|---|---|---|---|---|
| Age (years) | 39.1 | 8.4 | 22-57 | .117 |
| Education (years) | 11.2 | 1.4 | 8-16 | .184 |
| Experience (months) | 38.4 | 7.2 | 6-42 | .085 |

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002A were administered during the last quarter of 1964.

CRITERION

The criterion data consisted of a comparison ranking made by 82 supervisors in which the rater was required to rank the Licensed Practical Nurse from best to worst on two aspects of performance: (1) Quality of work and (2) Quantity of work. A sample member who ranked high on both Quality and Quantity was assigned to the high criterion group. The dichotomy led to two groups: the high group consisted of 52 Licensed Practical Nurses and the low group of 42 Licensed Practical Nurses.

Reliability:

Evidence of reliability was inferred from the relationships between the Comparison Ranking and parts of the SP-21 Rating Scale. Evidence is shown below:

Biserial r's Correlating Quantity and Quality
on SP-21 vs. Quantity and Quality
on the Ranking Comparison, Respectively

N=94 (High Group of 52; Low Group of 42)

| | Comparison Ranking Quantity | | Quality | |
|---|---|---|---|---|
| | $r_{bis.}$ | S.D.$_{r_b}$ | $r_{bis.}$ | S.D.$_{r_b}$ |
| SP-21 Quantity | .795 | .064 | | |
| SP-21 Quality | | | .790 | .065 |

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 45% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers."

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes N, Q and M which do not have high correlations with the criterion were considered for inclusion in the norms because the qualitative analyses indicated that the aptitudes might be important for job duties and the sample had a relatively high mean score on aptitude M and a relatively low standard deviation on aptitudes N and Q. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performance)

| Aptitudes | Rationale |
|---|---|
| G - General Learning Ability | Necessary to understand and apply nursing procedures and supervisory instructions. |
| N - Numerical Aptitude | Necessary to make measurements involved in temperature, pulse, respiration, etc. and to administer correct dosages of medications and injections. |
| Q - Clerical Perception | Necessary for keeping accurate records. |
| M - Manual Dexterity | Necessary for handling large pieces of medical equipment and handling materials. |

TABLE 4

Means, Standard Deviations (SD), Ranges, and Biserial Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 94

| | Mean | SD | Range | Biserial r |
|---|---|---|---|---|
| G - General Learning Ability | 87.8 | 10.0 | 66-123 | .255* |
| V - Verbal Aptitude | 94.1 | 12.1 | 72-135 | .118 |
| N - Numerical Aptitude | 86.7 | 11.1 | 63-119 | .243 |
| S - Spatial Aptitude | 86.0 | 15.7 | 55-133 | .019 |
| P - Form Perception | 89.5 | 16.2 | 46-131 | -.082 |
| Q - Clerical Perception | 96.3 | 12.5 | 57-129 | .100 |
| K - Motor Coordination | 100.6 | 14.8 | 58-140 | -.060 |
| F - Finger Dexterity | 99.8 | 19.0 | 54-147 | -.045 |
| M - Manual Dexterity | 102.9 | 17.9 | 65-151 | .048 |

*Significant at the .05 level.

TABLE 5

Summary of Qualitative and Quantitative Data

| Type of Evidence | Aptitudes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G | V | N | S | P | Q | K | F | M |
| Job Analysis Data | | | | | | | | | |
| Important | X | | X | | | X | | | X |
| Irrelevant | | | | X | | | | | |
| Relatively High Mean | | | | | | | X | X | X |
| Relatively Low Standard Dev. | X | X | X | | | X | | | |
| Significant Correlation With Criterion | X | | | | | | | | |
| Aptitudes to be Considered for Trial Norms | G | N | | | | Q | | | M |

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of G, N, Q, and M at trial cutting scores were able to differentiate between 55% of the sample considered proficient workers and 45% of the sample considered less proficient workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, cutting scores of slightly higher than one standard deviation below the mean will eliminate about one-third of the sample. And for four-aptitude trial norms, cutting scores for slightly less than one standard deviation below the mean will eliminate about one-third of the sample. The phi coefficient was used as a basis for comparing trial norms. Norms of G-85, N-80, Q-85, and M-80 provided optimum differentiation for the occupation of Nurse, Licensed Practical (medical ser.) 079.378-026. The validity of th norms is shown in Table 6 and is indicated by a phi coefficient of .30 (statistically significant at the .005 level).

TABLE 6

Predictive Validity of Test Norms
G-85, N-80, Q-85 and M-80

| | Nonqualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Workers | 19 | 33 | 52 |
| Poor Workers | 28 | 14 | 42 |
| Total | 47 | 47 | 94 |

Phi Coefficient =.30 Chi Square ($X^2_y$) = 8.5

Significance Level = P/2 $<$ .005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-18 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A phi coefficient of .13 is obtained with the OAP-18 norms of G-90, V-80, and K-85.

"Although the data for this study do not meet all the requirements for incorporation into OAP-18 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery, this study was placed as a "**" occupation in this OAP. A phi coefficient of .34 is obtained when the OAP-18 norms of G-90, V-80 and K-85 are applied to the combined validation and cross-validation sample."

CHECK STUDY RESEARCH SUMMARY SHEET FOR S-270R

S-270R GATB Study #2363

Check Study #1 Research Summary

Sample:

111 female students enrolled in the practical nurse program at Swedish Hospital in Minneapolis, Minnesota.

Thisstudy was conducted prior to the requirement of providing minority group status. Therefore, minority group composition is unknown.

TABLE 7

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Aptitudes of the GATB. N = 111.

| | Mean | SD | Range | r |
|---|---|---|---|---|
| Age (years) | 20.2 | .6 | 17-51 | .242* |
| Education (years) | 12.1 | .5 | 12-16 | .096 |
| G - General Learning Ability | 102.1 | 12.0 | 73-129 | .461** |
| V - Verbal Aptitude | 102.3 | 10.9 | 82-135 | .540** |
| N - Numerical Aptitude | 101.5 | 14.7 | 65-145 | .287* |
| S - Spatial Aptitude | 104.3 | 16.0 | 68-140 | .063 |
| P - Form Perception | 117.6 | 17.4 | 71-172 | .192* |
| Q - Clerical Perception | 119.7 | 16.5 | 79-161 | .317** |
| K - Motor Coordination | 113.5 | 16.2 | 78-169 | .193* |
| F - Finger Dexterity | 107.9 | 15.6 | 73-145 | .032 |
| M - Manual Dexterity | 104.0 | 18.6 | 56-144 | .112 |

*Significant at the .05 level.
**Significant at the .01 level.

Criterion:

Grade Point Averages.

Design:

Concurrent (test and criterion data were collected at approximately the same time)in 1961.

Concurrent Validity:

Phi coefficient = .26

Effectiveness of Norms:

Only 75% of the nontest-selected students used for this study were good students; if the students had been test-selected with the S-270R norms, 82% would have been good students. Twenty-five percent of the nontest-selected students used for this study were poor students: if the students had been test-selected with the S-270R norms, only 18% would have been poor students. The effectiveness of the norms when applied to this independent sample is shown graphically in Table 8:

TABLE 8

Effectiveness of S-270R Norms
on Check Study Sample #1

| | Without Tests | With Tests |
|---|---|---|
| Good Students | 75% | 82% |
| Poor Students | 25% | 18% |

TABLE 9

Concurrent Validity of S-270R Norms
on Check Study Sample #1

| | Nonqualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Students | 15 | 68 | 83 |
| Poor Students | 13 | 15 | 28 |
| Total | 28 | 83 | 111 |

Phi coefficient = .26 Chi Square ($X^2_y$) =7.5

Significance level = P/2 $<$ .005

**FACT SHEET**

Job Title

Nurse, Licensed, Practical (medical ser.) 079.378-026

Job Summary

Performs assigned nursing duties, under supervision, in caring for patients in hospital or at home. Provides assistance to patients in dressing, personal hygiene, and feeding; answers patient's signal light or bell, ascertains patient's needs or desires, and complies with request if not contradictory to physician's orders. Promotes patient's cooperation, gives information on health habits and maintains comfortable environment for patient. Renders care for promotion of comfort when patient is in an unwieldly and heavy apparatus or appliance; assists patient and instructs him in corrective exercises as prescribed by physician.

Sets up instrument and supply trays, positions special equipment, prepares patient , and assists physician with examination and/or treatment. Prepares and applies dressings, compresses. and packs: takes patient's pulse, temperature, and blood pressure, recording when authorized, on patient's chart. Pours, measures and/or counts out authorized medicine and administers prescribed dosage to patient. Keeps record of patient's food and fluid intake and output as ordered by physician.

Prepares patient for either surgery or obstetrical treatment; sets up equipment in operating and delivery rooms; hands instruments and supplies to surgeon or obstetrician or professional nurse during surgery or delivery. Observes postoperative condition of patient and condition of newborn and reports to professional nurse unfavorable reactions, such as bleeding or infection, weak pulse, shallow respiration, or sudden reduction in blood pressure. Assists in emergency treatment, such as administration of oxygen, glucose, blood, or blood plasma, to counteract unfavorable reactions.

Feeds newborn or takes infant to mother for feeding, on prescribed schedule; records type and frequency of feeding and, for bottle feeding, amount of intake; prepares formulas for infants. Prepares, sterilizes, stores, and fills approved requisitions for instruments, dressings, solutions, and supplies; maintains records of items issued and posts charges against patient or department.

Effectiveness of Norms

Only 55% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with theS-270R norms, 70% would have been good workers. 45% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-270R norms, only 18% would have been poor workers. (Validation sample)

Only 75% of the non-test-selected students used for this study were good students; if the students had been test-selected with the S-270R norms, 82% would have been good students. 25% of the non-test-selected students used for this study were poor students; if the students had been test-selected with the S-270 norms, only 18% would have been poor students. (Cross Validation sample)

Applicability of S-270R Norms

The aptitude test battery is applicable to jobs which include a majority of duties described above.

GPO 905.369

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